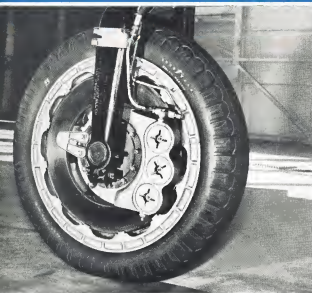


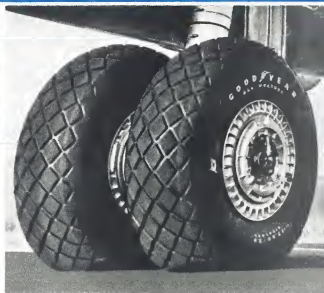
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This superior wear-resistance . . . together with inherent resistance to corrosion . . . makes NI-Resist an outstanding material for resisting erosion by liquids and slurries. By long, trouble-free control of erosion, NI-Resist castings reduce maintenance costs, production tie-ups and the expense of replacements.

## WITHSTANDS HEAT

Although primarily used to resist corrosion, acids and metal-to-metal wear . . . NI-Resist is also specified for resistance to elevated temperature effects. Castings of NI-Resist show up to 16 times better scaling resistance, and up to 12 times better

growth resistance than those of plain iron at 1300 to 1500°F.

## MACHINABILITY AND OTHER PROPERTIES

NI-Resist of normal hardness machines like 200 cast gray iron and is readily weldable.

NI-Resist has high specific electrical resistance. Thermal expansion can be controlled, from 60 per cent higher than that of plain iron to a low approximation of that of Invar.

NI-Resist is usually lower in cost than most other corrosion-resistant alloys. It is produced by authorized foundries only, in all industrial centers of the country. NI-Resist castings have no size limitations in size and complexity than those of any gray iron.

## APPLICATIONS

Several types of NI-Resist are available. All provide the fundamental properties described above, and differ only in certain special characteristics to meet a variety of industrial demands.

Applications include: shaft filter drains, oil refinery tube supports and headers, turbine nozzle liners, cylinder liners, valves and fittings, furnace rollers, textile rolls, compressor parts, blow pit pipes, precision machine tool spindle heads, bridges, and work supports, magnet housings, water meters, etc.

## FULL INFORMATION

May we send you two booklets? One, entitled, "Engineering Properties and Applications of NI-Resist," includes corrosion data on NI-Resist and most 16 other 400 different corrosion conditions. The other, entitled, "Engineer's Guide for NI-Resist Castings," lists producers of NI-Resist castings. Both are yours for the asking. Write for them today.

—ENR-100



**THE INTERNATIONAL NICKEL COMPANY, INC.** 87 WALL STREET NEW YORK 5, N.Y.

## NEWS SIDELIGHTS

### Deeduls Flies Again

Between 2000 and 18,000 still in running of the original 16,500 pilots who flew for the U. S. Army Aviation Section of the Segal Corps and the U. S. Army Air Service, before Jan. 12, 1918, are potential members of the new, as established Order of Deeduls.

Lt. Gen. K. B. Wallis, deputy chief of staff, USAF, for retired, and newly elected commander of the order is opening a drive to recruit all Army men of World War I and order into the Deeduls with the announcement that the original recruiting class of the Deeduls, that the members had remained in active service for as long as applicable, and that membership is now open to any old soldier pilot who had flown on Aviation Day of World War I or before.

Organization takes its name from the legendary Greek god, Deeduls, whose father, Zeus, named him to his shoulders, which is the sun and dropped him to his death in the Aegean Sea, symbol of the many World War I pilots who were shot down in Europe. Eligible for membership are a number of the top USAF officers and members of the Air Service and Aviation Section pilots now in the aviation industry or retired.

### Non-Skid Problems

Relatively low passenger load factors on the unstaffed transcontinental DC-4 coach service of TWA and American Airlines are expected to put the gloom scenario of non-skid problems on the airlines' agenda. The airlines' airports were then over 100 million sq ft of floor area, and the airlines' airports were then over 100 million sq ft of floor area, and the airlines' airports were then over 100 million sq ft of floor area.

### O'Connell on Jets

CAB Chairman O'Connell failed to make head to tail plane leaders when he observed in a recent Los Angeles

### Missiles Bid

Director of Air Force Research and Development Administration, in an effort to win a variety of new projects as able USAF had for longer than of research and development funds. A Navy's response in developing its own missile research and development program there, with the Navy, the Navy and the Navy. Navy has stated the fact that it is getting better than 60 percent of total missile research money since the Navy's share the remaining 40 percent with Army. General Tamm said on 20-20. That leaves USAF getting only about one-fifth of total missile research money, though the total is substantially greater than the Navy with which it is frequently but increasingly compared research work.

speech that the U. S. aviation industry was "taught to fly" in the development of jet transports. O'Connell said that a year and a half ago, when he was the newly elected and still somewhat naive CAB chairman, he made a case of non-skid problems and airline installation. He said if jets, then, were built for low and low, the airlines might not be adopted for commercial operations in the relatively near future. "The aircraft industry response was that commercial jets were in at least 20 years away," the chairman declared. "Yet exactly eighteen months later the British and Canadians had not flown large jet transports and we were installing them in the world's airports." O'Connell said that so long as the government study on a postage program, and as long as non-skid problems receive military attention that is virtually daily, the plane builders are not likely to enter the jet transport field actively.

### Way of a Pioneer

Intensifying made on the award of a Department of Commerce gold medal to John C. O'Connell, Jr., Secretary of Commerce Service, is that O'Connell, veteran CAA lightplane consultant, was dropped from the CAA payroll shortly before the award was announced although he can be back on in the time that is passed.

Award is being made for his part in fostering development of personal planes, personal flying and the continued leading group now generally conceded to be a successful movement not only for small planes but for transports as well as the DC-3.

CAA observes that a large part of O'Connell's hardest work in pioneering lightplane improvements was in putting his ideas over with some of the less progressive-minded people in CAA.

### Flight Time Economy

Defense Secretary Louis Johnson's Air Force economic budget may cost the draft of 12 to 15 Air National Guard pilots before June 30, according to a study made by the National Guard Air of the U. S.

Maj. Gen. E. A. Walsh, president of the association, warned that a reduction of flying time, put into effect at a "string" of the reduction, may result in a loss of number of the force near 15.

Gen. Walsh pointed out the close relationship between the performance of the pilot and his number of hours of flying time in a given period. "Air Guard pilots should be getting more flying time, not less," he asserted.

### Flight Plan Filing

First step toward establishing a positive aircraft identification system should be made in the near future, the nation will be accomplished in soon as the CAA can publish the directive. Preliminary calls for all civil aircraft pilots to the flight plans and make reports upon when flying in the system over extended areas of the U. S.

So far civil pilots will be required to file flight plans covering any extended flight operation are more within 100 miles of the coastline, and the boundary of the U. S., southward to Norfolk, Va., are flight outside the defense area within 100 miles of Oak Ridge, Tenn. Hartford, Wash., and Los Angeles, N. M.

Franklin prohibited pilots are the ex-military service of Oak Ridge, Hartford and Los Angeles areas "out of bounds" for all air force. Air planes violating these areas whether on flight or on the ground will be reported to the military. Decisions covering the filing of flight plans by all civil pilots was issued upon shortly by the Army Air Force, Navy, CAA, CAR, and representatives of the airlines, private pilots and other officials.







## Employment Trend in Aircraft Plants

No of Plants	EMPLOYMENT				
	Sept.	Oct.	Nov.	Jan.	Mar.
Total aircraft	58	215,600	189,600	204,000	202,800
Complete assembly	27	170,100	154,400	151,200	149,100
Engines	12	34,900	34,400	38,800	39,300
Propellers	5	5,100	5,100	5,300	5,200
Parts	15	13,700	15,900	15,900	14,900

ing, and was declared at the first annual forum on aerospace flight sponsored by the university and the American Writers' Union.

► **Edward Rich**—Theoretical advantages of the jet are that the rocket jet gives the aircraft boost for a craft equipped with the jet, while the jet's characteristics supply sustained high speed flight.

In addition, the efficiency of the engine is increased by using the high velocity rocket gases to raise the temperature of the rear air and increase thrust.

The rocket motor, which produces 50 lb of thrust without liquid oxygen as the oxidizer, while ethyl alcohol, gasoline and diesel oil have been used as fuels.

Secretists at the forum declared that:

► **AF and Navy** are severely handicapped by lack of trained pilot-technicians. NACA has been personnel in this category, but there are not enough of these. Princeton has a school designed to overcome this deficiency.

► **Existing wind tunnels** cannot accurately predict the performance of aircraft in the transition and supersonic ranges. Princeton research effort for the present must be actual flight testing. In connection with the forum, Princeton distributed a 1940 mph flow-down tunnel with a 4 x 6 in. test section that will take models up to 12 in. long.

► **Current missile development** at the U. S. in some respects still has not advanced this stage. The Germans had reached at the end of World War II, according to Dr. Robert E. Gibson, of the Applied Physics Laboratory of Johns Hopkins University.

► **A shrouded pulser engine** could become an economical competitor of the rocket. This type of engine is one of several being worked on at Princeton. The shroud can increase the velocity of the propellant gases to about 500 mph to the optimum speed.

► **A 20 percent cut** in fuel consumption of a rocket motor is theoretically possible by increasing the operating pressure from about 200-300 psi to more than 1000 psi. But severe cooling problems would be encountered.

## New Exemptions In Renegotiation

New renegotiation exemptions put in force recently by the Department of Defense now permit that renegotiations will not be involved in addition to material, equipment or services used in full filling an armed services contract under the material, equipment or services but covers a part of the product for which the contract was let.

The new policy retroactive to contracts to May 21, 1948, by order of the Military Renegotiation Policy and Review Board, spells out the following exceptions:

- Subcontracts for manufacturing or installation of machinery, equipment or materials including component parts or subassemblies used in producing an end product as its parts which do not become a part of the product or its components.
- Subcontract for manufacturing or installation of machinery, equipment or materials including component parts or subassemblies used in producing an end product as its parts which do not become a part of the product or its components.
- Subcontract for manufacturing or installation of machinery, equipment or materials including component parts or subassemblies used in producing an end product as its parts which do not become a part of the product or its components.

lative of machinery including complete units or subassemblies used in the producing of other machinery to be used in making the end product or its part.

► **Services directly required** to carry out the terms of these two clauses.

► **Contracts and subcontracts** for the performance of personal or professional services where the individual works under government supervision and is paid on a time basis. This does not apply to contracts for performance of services by a firm or organization.

► **Contracts and subcontracts** for items to be used by the government such as clothing, and portable food stuffs.

A five-man Industrial Renegotiation Board, created by Defense Secretary Louis Johnson, will handle appeals on questions involving military security in industrial matters. John F. Mason, production coordinator of the Department of Defense has been named chairman by the Materials Board, while the other three members will be designated by the secretaries of the three armed services. The industrial board will establish regional boards.

## Fairchild Delivers 40 C-119 Packets

Fairchild Aircraft division, Hagerstown, has delivered 40 Packet C-119s out of the 176 of this new combat cargo plane type on order by USAF and Navy. Developed from the earlier C-82 Packet, the C-119 has been redesigned to overcome pilot objections by re-

locating the pilot compartment forward to give pilots an unobstructed view for formation flying and as delivering payloads over a drop zone.

C-119 cargo capacity has been increased to 2700 sq ft with a 14-in. widening of the fuselage to conform with new Army Air Force specifications among towards the still "pink-the-soup" military class of complete air transportability. The new plane can now load the 115mm howitzer, a heavy truck, or several jeeps, via clamshell door which opens the entire rear cargo compartment at track-bed level.

An electrically operated overhead clamshell system installed in the cargo compartment provides loading facilities for twenty 500-pound parachutes of supplies. These can be dropped over the drop zone in less than two seconds through a hinged access port.

Capable of carrying a maximum of 30,000 pounds payload, the C-119, equipped for parachute operations, can lift 42 fully equipped paratroopers plus twenty 300-pound gun-crew or supplies within a 1400-in. radius and return without refueling. As a transport it can land 64 passengers, or 35 litter patients and four medical attendants. In glider operations it can tow either a 30,000-pound glider or two 15,000-pound gliders.

Four Westinghouse R-6160 engines developing 1500 horsepower have been installed which give the plane a maximum speed of 246 mph at 15,000 feet. With a gross weight of 54,000 pounds, service ceiling is 21,500 feet.



REVEAL XF-91 VARIABLE WING

could 40 flights. High-speed test data was needed to verify wing to test in slow landing speed, showed lower than existing aircraft types. Aircraft design was also low-speed stability. XF-91 has 31 ft span and a 49 ft. long. It weighs 12,000

lb fully loaded. Craft is powered by General Electric J47 turbojet engine, used 5100 lb static thrust and using an afterburner for sustained short period thrust. Mr. Burk and S. Johnson will fly new fighter through Phase II tests at Edwards AFB, Calif.

## Aircraft Employment Declining

Greatest losses will come in airplane plants, and on West Coast; engine and parts plants may rise.

Aircraft employment has been dropping, and the trend will continue at least through March.

Consolidated declines have been in airplane plants and, geographically, on the West Coast.

Greater availability of labor has caused aircraft employments to be more selective. Fewer workers are employed. Even so, in plants doing experimental work three strains tend for more in general, draftsmen, tool and mold makers and experimental mechanics in manufacturing.

These are conclusions of the U. S. Employment Service based on reports from 58 aircraft plants employing about 55 percent of the industry's work force recently shown.

► **Employment** at dropped in the 18 plants from 215,600 in September to 206,800 in November. (For the entire industry, the Bureau of Labor Statistics reports that average monthly employment was higher in 1949—226,000 a month through December—than in 1947 and 1948—228,000 a month.)

► **Decline** was shared by all branches of the aircraft industry except propellers, where employment remained stable.

► **In California and Washington**, overall employment dropped 7,300 from September to November. In New England employment 15 percent of the aircraft workers, the decline was 2000.

The 58 plants reporting to USERS report their employment to date to 236,490 in January and to 201,100 in March. About half of the plants will increase employment, but the gain will be overshadowed by job reductions in one-third of the plants.

Airframe plants anticipate the heaviest decline in jobs. From 151,200 in November to 145,900 in March, with the West Coast suffering the steepest loss.

Aircraft plants on the West Coast expect job cuts of \$250 from November to March. Kansas is the only state

in which plants expect substantial employment increases. The rise is estimated at 2500 workers, or 17 percent. Engine and parts plants anticipate slight job increases by March.

## Ducted Rocket Offers Ramjet Improvement

Principles—The answer to the odds of what type propulsion device can equal the high-speed performance of the swept engine, but still give efficient operation at low speeds may be found in a new type of engine combination called the ducted rocket.

Research on the ducted rocket, which essentially is a rocket motor installed in the duct of a swept engine, is being carried out here under the Navy's Project Squid at Princeton University's department of aeronautical engineering.



AIR FORCE MASS TRAINER

U. S. Air Force's C-119 will be used for mass training of recruits. Gateway to recruit their employment to date to 236,490 in January and to 201,100 in March. About half of the plants will increase employment, but the gain will be overshadowed by job reductions in one-third of the plants.

For three students. Mass training is the new system today and recruits are required to simulate actual flight in a training facility. There are few students for taking student flights.





## SALES & SERVICE

### New Lightplanes in the News . . .



**CRUISEMASTER:** Bellanca's 1910 four-place craft (AVIATION WEEK, Jan. 10) has won 170 hp. Leaning engine and Merlin 5 controllable prop, rated

to give the plane cruising speed of 150 mph, but of any American personal plane. Stalling speed of 40.6 mph has been achieved. With 40 gal. of fuel, range of 640 mi. is claimed.



**SPRAYER 170:** This special version of Cessna four-place has been adapted by Yeagley Aircraft, Inc., Wichita for agricultural uses. Check-up of cabin heater shows Lohquod 55 gal. tank mounted by stainless steel

straps. Spray controls, pressure relief valve, and spray pressure type are set in conveniently mounted panel at pilot's right. Electric driven pump forces liquid out to the spray nozzles which are located under the wings.



**AIRPHIBIAN:** Two-seater Feltus flying out in strong tail of C-45 trade and is expected to achieve certification soon. Price has not yet been announced, but designer Robert Feltus is now focusing a double registration to handle sales. Photo shows latest prototype having new straight

through wing-replacing outer half with new type windshield and improved soundproofing. Over 4000 construction hours are to plane, as yet none, have been made and prototype has completed over 200,000 mi. of air and ground travel. Production is to be handled at Danvers, Conn., by Consolidated, Inc.

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- With amplification, records output of strain gauges and thermocouples.

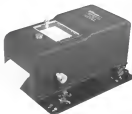
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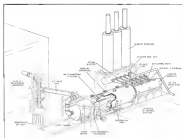
In this space we had intended to reproduce a portion of a sheet showing the sharp, black trace produced by our heated jewelry-style pen on Thermoflex paper. We find, however, that no printing press can adequately reproduce our recorder trace, which has the characteristics of a fine steel engraving. Let us send you a sample of an actual recording.



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## AERONAUTICAL ENGINEERING



Sketch showing overall aspects of 2000 walk, 30,000 ft., mount top looking

the custom of the test facility. Construction was moved in August, 1945, construction was begun the following December, and the facility was operating just one year later—December '47. (Actually, the company began major development work in November '45, when it began a program of basic study, design and test in that form of propulsion.)

► **Cost-Reduction** at mixing equipment at the Wood-Bradley plant brought the cost of the new wrap down to \$600,000. Then, pressure air is supplied by compressors from the company's 1.15 horsepower engines, located in the adjacent turbine development lab. And the plant's main prechamber humidifier draws in an oxygen system to create a steam condition at the target 65,000 psi.

Services for the last installation can apply at these hourly rates—\$600 per hour of fuel, 140 man of air, and 190 tons of steam.

This component of the test facility is a long, two-part, 12-ft-diameter shaft housing a large chamber connected to the air inlet pipe followed by the test section which is approximately 8 m long up to 20-in diameter. Modifications are planned to allow test of nozzles having diameter up to 40 in.

The large chamber may be separated from the test section properly and rolled back to allow replacement of units under test. The entire facility, measuring 96 ft in length, is wheel supported on tracks to take up expansion caused by the extreme heat, which reaches 4000 F.

## Wright Aero Pushes Ramjet Study

New test installation keyed to existing air and steam facilities to cut cost; constructed in one year.

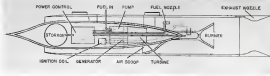
A positive indication of the extent of Air Force interest in target research is revealed in a new, Mach-4, 50,000 ft. altitude test facility now operating at Wright Aeronautical Co.'s Wood

**Ridge, N. J., plant** The company probably is conducting some extensive research studies that offer non-government researchers in the country.

Environ Biol Fish (2015) 98:1011–1021



Sarge chamber (left) rolled back from test version reveals table and adapter for resist heater. Chamber (right) shows wiring ports.



Schematic illustrating principle of swept engine

at the exhaust end of the chamber.

► **Operation-Combustion section.** As the test is supported on a platform and hooked to the swept chamber via an adapter. Whereas an actual combustion section for a swept engine would be a relatively thin shell coated with a heat-resistant material, those used for testing at Wright Aeronautical Laboratory to permit extended test runs without considerable distortion from the high heat generated.

Exhaust is led into an exhaust manifold connected to a series of steam jets to control the speed of the escaping gas. A bypass line is used to carry the exhaust when the steam system is not operated. Steam lines and bypass are coupled to a manifold at the base at about 45th degree angle.

An atmosphere air inlet is used to the base leading from the T-15 engine power to the swept chamber. With pressure not cut off, the combustion of atmosphere air in the steam portion is used to simulate extremely high altitude for low density conditions.

One of two vacuum hoses T-15 was attached and the bypass line (no steam system) serves for low altitude operating conditions.

Combination of two pressure and thrust probes simulates intermediate altitude conditions.

► **Observation Problem.** A control house is located alongside the facility, but has no provision for viewing the test unit in the chamber. Thus, as, however, two observation ports in the chamber shell appear the test section, and so offer at the end of the cylinder manifold. A subsonic type pressure, obtained from the Navy, is now being modified to serve as the observation link between the control house and the test chamber. It will tip the test chamber at the forward position at the engine manifold.

Possibility of color television previously had been investigated at Wright Aeronautical (Wright, July 18, 1949) for studying combustion phenomena in swept engine and to eliminate the danger of close up viewing. And although it is felt that better reproduction of flame color is desired, the method still makes high observation section under consideration. If this viewing procedure finally is adopted, it will be used to give periodic pictures of combustion and simultaneous instrument readings for complete analysis.

► **Not So Simple.**—The simplicity implied for the swept engine by the "big wing" development is, in reality, misleading. While, conceptually, it was considered a simple engine, the accompanying Wright Aeronautical describing these principles at such a

powerplant shows some of the factors involved.

► **An actuating mechanism is required in cooperation with the power control used for fuel metering and other functions.** In this instance it would appear, from the design purposes and the shape of the combustor, that the mechanism would be some kind of lever system.

► **A turbine** supplied by air and vented to the atmosphere operates at a pressure ratio greater than 10:1 to drive the fuel pump and generator. The air scoop for the turbine also serves as support for the combustor body.

► **Pilot nozzle** in the burner gives initial combustion, and when the turbine reaches traveling downstream from the main fuel nozzle, the burner flame, total combustion is attained.

Temperatures and pressures involved in swept engine design development of materials having properties far beyond those currently in common use today. It is probable that an experimental swept engine will be used that have not appeared previously in existing engines.

Wright Aeronautical swept engine benefits down into three groups: aerodynamic, combustion, aerodynamic, swept engine engineering, design and operation. Jack Chubbuck heads the swept engine project as division manager.

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## More Briefs From IAS Sessions

These digests continue American Women's presentation of subjects discussed at the 15th Annual Meeting of the Institute of the Aeronautical Sciences in New York, Jan. 23-25. Other summaries appeared last week.

### METEOROLOGY

Several factors increase the probability of rainfall in New Mexico—Livingston, Grand Electric Research Laboratory.

In October 1949 and July 1949 studies were made at New Mexico of the atmosphere

and formation of rainfall produced by introducing subsonic nuclei into the atmosphere. The probability for the initiation of self-propagating clouds depends not only on the droplet initiation, including negative effects, but also on the concentration of subsonic nuclei (collected in actual). A quantitative relationship, analogous to the barometric equation, was indicated, according to which the logarithm of the lowest probability (threshold) was a linear function of the logarithm of the concentration of subsonic nuclei.

A study of the intensity of rainfall and its distribution in space and time in relation

to the place and time of rainfall made possible a separation of the effects of naturally occurring nuclei from those introduced artificially. Thus, as at least two days, which involved the greatest amounts of rainfall, it was found that a probability for rain greater than 10% is that possibly all the 10' tons of rain that occurred on each of these days was the result of seeding.

### STRUCTURES

An Initial Approach to the Overall Structural Problems of Swept Wings Under Static Loads—E. E. Schuler, M. E. Williams and Y. C. Fung, California Institute of Technology.

For the past 25 years, under Aeronautics, Collett's Guggenheim Aeronautics

of life in this environment, the subject of the stresses in this, and the high loading. The composite has utilized three types, experimental, and elastic analysis methods in an attempt to represent the most of all stressors present on the problem, and this paper presents a general review of the progress. The problem has been ascertained to be a flow problem, as the stress is shown by increasing the wing from a selected section consisting of a thin skin to a thin skin analysis technique.

A solution of this one has been obtained by expanding the deformation function, or known as a linear combination of the normal modes of vibration, with the coefficients being determined by the Raleigh-Ritz method. The effect of wing flex on the stress is accounted by introducing elastic analysis. The structural analysis solution has been largely achieved with a structural analysis technique by the method of the Raleigh-Ritz method. The effect of wing flex on the stress is accounted by introducing elastic analysis. The structural analysis solution has been largely achieved with a structural analysis technique by the method of the Raleigh-Ritz method.

The paper concludes with a statement of the progress in progress and analysis of the problem. The problem has been ascertained to be a flow problem, as the stress is shown by increasing the wing from a selected section consisting of a thin skin to a thin skin analysis technique.

Types of behavior of Structural Materials and Properties of Composites—Alfred M. Rosenblatt, Professor of Civil Engineering, Columbia University.

Conventional design of structural materials and parts is generally based on the assumption of the classical theory of elasticity at the same time structural analysis is based on the basis of an assumed plastic behavior of materials. The plastic behavior of materials is based on the basis of an assumed plastic behavior of materials. The plastic behavior of materials is based on the basis of an assumed plastic behavior of materials.

Modern conditions of service of structural materials and parts are generally based on the assumption of the classical theory of elasticity at the same time structural analysis is based on the basis of an assumed plastic behavior of materials. The plastic behavior of materials is based on the basis of an assumed plastic behavior of materials.

A structural analysis is presented of the various types of composite at structural analysis and of three different types of composite at structural analysis. The paper presents a general review of the progress. The problem has been ascertained to be a flow problem, as the stress is shown by increasing the wing from a selected section consisting of a thin skin to a thin skin analysis technique.

Analysis of the Elastic and Plastic Behavior of Sandwich Panels by the Method of Stiff Springs—P. P. Birkhoff, Professor, Faculty of Technology, Delhi, India.

The author presents an extensive but simple description of the behavior of the sandwich panels under various loading conditions. The paper presents a general review of the progress. The problem has been ascertained to be a flow problem, as the stress is shown by increasing the wing from a selected section consisting of a thin skin to a thin skin analysis technique.

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#### AIRCRAFT DESIGN

Structural Control Design for the War Fish Span-Flex on Strong and Weak Wings—P. M. Rappaport, J. G. Lewis, and J. R. Lippert, Naval Aeronautical Laboratory, NACA.

The paper presents a general review of the progress. The problem has been ascertained to be a flow problem, as the stress is shown by increasing the wing from a selected section consisting of a thin skin to a thin skin analysis technique.

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## AVIONICS

$$T_1 = T_2 + TD \text{ (TIME DIFFERENCE)}$$



Basic principle of distance measuring equipment operation.

## DME Is Top Navigational Need

By 1962, nearly \$50 million worth of distance measuring equipment will be bought in phase of avionics program.

By Robert McLauren

"The lack of distance information in the cockpit is one major navigational need."

This statement by the Radio Technical Commission for Aeronautics Special Committee 31, key to make a high program of development, production and installation on which the Civil Aeronautics Administration will spend a total of \$22,648,149 for ground stations and by June 30, 1972, an estimated \$30 million will be spent by the Air Force, Navy, and Army and private pilots for distance measuring in the next five years.

It is estimated that by 1962 about \$18 million worth of distance measuring equipment will have been purchased to meet the delivery program in the next, approximately by the RTCA.

Indicative of the pending need for distance measuring equipment is its assignment of top priority by the RTCA, whose SC-31 report states: "The primary deficit from the operational standpoint for implementation of the program of the target navigation system is as follows: a Distance Measuring, B, etc."

Where Operating—Distance measuring equipment (DME) installation is already in operation at CAA airports: Seattle, San Francisco, Ind., Wright-Patterson Air Force Base, Dayton, Ohio; Patuxent Naval Air Station, Patuxent River, Md.; Fort Rucker, Ind.; Lafayette, Ind., and Philadelphia, Pa. The latter installation has a "ferry equipment" and is scheduled shortly for removal to Dayton, Ohio.

There are two installations at Indianapolis, making a total of seven installations in all. All of these installations are experimental only and are for purposes of evaluation and test of both ground and airborne equipment under a wide variety of terrain and weather conditions and operational methods similar to civil. Air Force and Navy avionics facilities.

CAA Plans—Although the original installation program has been delayed by the extensive instrument and avionics program, the CAA alone to install an airborne system of 171 stations in the continental U. S. at a cost of \$20,337, 896 by June 30, 1972.

In addition, there will be 22 stations onshore: 2012, 263 in Alaska, 12 stations onshore: 1511, 196 in the Caribbean, and 18 stations onshore: 1558, 79 in the Pacific.

This is a total of 715 units at an expenditure of \$22,648,149.

Definitions—The RTCA SC-31 report defines DME as follows: "The primary deficit from the operational standpoint for implementation of the program of the target navigation system is as follows: a Distance Measuring, B, etc."

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IN 1950

# AMERICAN *sets the pace-with the* FLAGSHIP FLEET!



*The largest and most modern fleet of transport aircraft in the world today!*



In 1950—the fleet of the year is the Flagship Fleet! For American Airlines, and only American Airlines, offer such a vast fleet of aircraft, such a completely modern fleet in every respect. And such a variety of service as well—for both the DC-6 and the

Convair are designed for the type of route they serve.

So whether you're traveling coast-to-coast, or to a nearby city, make sure you go by air and by American Airlines Flagship. Then you will enjoy air travel at its best on every trip.

## THE DC-6 FLAGSHIP

The DC-6 Flagship is the most modern, most comfortable choice of passengers from coast to coast.



## THE CONVAIR FLAGSHIP

Especially designed for shorter routes, the Convair is especially popular for its comfort and speed.



**AMERICAN AIRLINES INC.**

AMERICA'S LEADING AIRLINE



# 60,000 feet UP in 2 minutes!

Over 11 miles... straight up... in two minutes... 40,000 feet in the first minute... and operating perfectly every foot of the way... that's the kind of performance Pesco engineers are building into Pesco fuel pumps.

In Pesco's new fuel system test laboratory—a special building, specially equipped—Pesco engineers are constantly subjecting Pesco fuel pumps to operating conditions which reproduce perfectly the same conditions under which fuel pumps must perform in actual flight... conditions of abrupt altitude, temperature and pressure changes... changes even in the physical characteristics of the fuel.

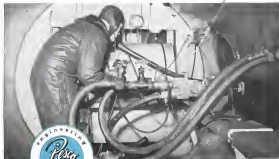
Not once, but many times each pump must repeat the grueling tests... pumping millions of pounds of fuel without benefit of lubrication. After each test, each pump is disassembled and every part checked. That's why Pesco engineers know Pesco pumps will deliver.

Testing is only one step in Pesco's program of research, engineering, manufacturing and testing that is constantly setting new and higher performance standards for fuel, air and vacuum pumps, hydraulic pumps and motors, and related accessories for the aircraft industry. It is an important reason why Pesco products will help your aircraft set new records for performance, safety and efficiency.

Looking inside the large altitude chamber in Pesco's new fuel pump test laboratory building. Every extreme and normal atmospheric condition under which aircraft fuel and vacuum must operate can be simulated here.



Pesco Model 921077 fuel pump fuel pump. This unit has a capacity of 42 gallons per minute at 150 p.s.i.



PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MIDER ROAD

SEDFORD, OHIO

## GCA Orders

Gallatin shows \$25-million backlog as program sports upward.

Gallatin Bros., Inc., Los Angeles, has awarded 1973 and a \$25 million backlog in civilian and military order production, research, development and service business.

Latest order is an additional \$8 million contract for GCA (ground control approach) radar landing equipment from the U.S. Air Force. Gallatin is building completely new GCA equipment for the Air National Command, Wright Field, to replace the 100 mobile GCA tractors and mobile in the Los Angeles area during the year.

▲**Airfield Aid-Fuel** of these are, air transportable GCA units which loaded \$4,000 aircraft during the Berlin Airlift. Under development contracts with the Air Materiel Command's Watson Laboratories, Gallatin has streamlined the original 32,000 lb. 5400 GCA to a 14,000 lb., 1400 unit which can be dismantled quickly and transported by plane to any part of the world.

The Air Materiel Command now has on order 27 air-transportable GCA's (CFN-44) and 48 PPN-16, a fuel type GCA for permanent installation at Air Force bases in the U.S. and abroad. GCA is now in operation at 167 military air bases throughout the world, and its use in civil aviation will soon be expanded.

▲**Gallatin GCA**—These military GCA's go to the Civil Aeronautics Administration by the USAF have been in operation at La Guardia Field, Washington National Airport and Chicago Municipal Airport for the past two years. These units are now being replaced by complete GCA designed and built by Gallatin for GCA. Gallatin says the four major military equipment at New York, Washington and Chicago has been ordered with seven over 30 planes under construction conditions.

Latest civil-type GCA equipment is now being installed at Los Angeles International Airport, Atlanta, Boston, Cleveland and St. Louis, as well as at New York, Washington and Chicago. GCA has scheduled 52 GCA units from at civil airports by 1975. The French government has ordered a GCA type GCA from Gallatin for installation at Orléans, France.

▲**Other Orders**—Industry of Gallatin's \$25 million backlog includes \$8 and

## PRODUCTION

from GCA replacement parts for the USAF, and a \$100,000 contract for 60 GCA technical representatives to assist the Air Force in maintenance, operation and control of GCA equipment on all parts of the world.

Under contracts from the Air Materiel Command's Watson Laboratories Gallatin is developing completely automatic GCA and is conducting research into other aspects of the radar navigation aid. The company is also engaged in research study of electronic weapons for the Naval Research Laboratory.

## Information Offices To Give Bid Data

Public Information Offices at the armed services in some major cities began Feb. 1 to provide bid information to small business. Locations will be selected soon.

At the close of business daily, the 73 major Air Force, Navy and Army purchasing offices will send a copy of each bid made up together with a synopsis giving type and quantity of material to be purchased, bid number and place and date of opening, to each Information Office. These offices will compile the synopsis and make them available to the press, the public and businesses in their areas.

Chief of the bid data will be kept on open file for anyone who wants more information.

The synopsis will give a businessman sufficient information about the work to be purchased to decide whether he wants to bid. Then he may either

write to the purchasing office for a copy of the full bid request or request the provision of his nearest military Public Information Office. In addition, purchasing offices will continue to maintain lists for the making of invitations to bid or advance notices of bid requirements, be business concerns. The information will be available at these offices for pickup or request.

## Pentecost Builds Ramjet Copter

Blanca T. Pentecost of Seattle, Wash., whose Ramjet Copter is being developed by an English firm, has developed a jet-powered version called the Fable.

Weighing less than 175 lb., the Fable is powered by two 10-hp. jet units mounted at each of the single rotor. Rotted gas will be used for fuel on initial flights scheduled tentatively for next June after the first of the year. Commercial models may be designed to burn kerosene or cheaper grades of gasoline for maximum operation.

▲**15-ft. Rotors**—The rotors drive the 15-ft. dia. rotor at about 900 rpm, Pentecost says. In the event of failure of fuel flow to the jets, the Fable can be brought safely to a power-off autorotative landing. Notable change from the Ramjet Copter is a dual tail autorotative opposed at a 45-deg angle. Fuel tanks are behind the pilot.

▲**Minor Components**—Pentecost says the aircraft is an improvement in that they have no moving parts to wear or cause mechanical malfunctioning. Absence of gears, clutches and high-speed rotor shafting supports will lead to low variable torque cost and low rotor speed, he believes. Lighter weight of the ramjet



## MAINTENANCE MADE EASY

First of an initial USAF order of 25 Bantons is shown at Northrup Aircraft, Inc., with leading edges and engine support "cutaway" to show mechanics how to trouble-proofing inspection and making repairs to the control, hydraulic and electrical systems.

From: Portion of this leading edge folds down on each side of the outboard control to provide work platform for engine maintenance. Note figure is accessible from a side-hinged inspection and making repairs to the fuel pump access to the top of the wing.





# it's the new Beechcraft for 1950



## "EXTRAS" make this NEW BONANZA a better buy!

- ★ New increased horsepower for better take-off performance
- ★ New safety-type control wheel
- ★ Four new individual arm-rests
- ★ New Beechcraft propeller for better performance
- ★ New RCA Radio with VHF
- ★ Three new utility map pockets
- ★ New increased and faster action flap travel
- ★ New and faster travel action for landing gear
- ★ New navigable light reflectors
- ★ New oil tank access door
- ★ New attractive instrument panel design
- ★ New exterior paint design
- ★ New interior upholstery combinations

**Ruggedness plus Speed... Performance plus Economy... Beauty plus Power**

The world wide operational records of the more than 2000 Beechcraft Bonanzas now in service are proof that the Beechcraft Bonanza delivers both payback, both speed, and low operating cost, combined with every safety and service detail — means that the new Beechcraft Bonanza is a better buy!

It's easy to take or leave the lightest Beechcraft Bonanza with its unique retractable flap and with extra type door flaps for 4 leg people to ride in comfort. Bonanza's low visibility and social ground — usually represents a value sold to the insurance lobby of this new Beechcraft Bonanza for 1950.

There are only a few of the hundreds of reasons why the new Model B35 Bonanza is a better buy! See it today! Get all the facts about the many new advantages of Beechcraft's first cost insured Bonanza's development or dealer — or drop a line of request to your nearest authorized Beechcraft Aircraft Corporation, Wichita, Kansas.

### Compare these performance features

- Top speed, 184 mph
- Cruising speed, 178 mph
- Range, 530 miles
- Service ceiling, 17,200 feet
- Fuel economy, 9 1/2 gal. per hour

### Compare these comfort features

- Excellent retractable flap
- Low engine vibration
- Insulated, sound-proofed cabin
- Quickly convertible rear seat
- Large, comfortable accessible rear seat

# Beechcraft

## BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

## NEW AVIATION PRODUCTS



**AUTOMATIC** sequencing of test signals permits fast, accurate check by use of unit of critical ILS system in aircraft. Tester is controlled manually when troubleshooting signal unit.

## Device Gives Thorough ILS Check

Pan American engineers claim it is the first unit which offers high degree of accuracy in test.

Instrument landing systems in aircraft get an accurate and complete overhaul check through use of the Model G218A ILS field test set, according to engineers using the new device.

Pan American Airways engineers, who have several months of trouble-free experience with the unit, say it is the first unit which really permits a high degree of accuracy and complete in operation. Other major users are Eastern Air Lines and KLM (Royal Dutch Air Lines), which report formerly on the ability and reliability of the unit, according to the manufacturer, Galska Engineering, Inc., 247 Conco Ave., Coral Gables, Fla.

Replaces Two Units—Pan Am has adopted the portable testing device to replace the RG-75 test set, which it used to check marker beacons, and the 1-1173A "base box," used for testing localizer and glide path receivers.

Pan Am engineers have no base to put with the RG-75 test set, but say the new box was not designed to give a true overall check of the glide path and localizer receiver. With this device,

engineers could tell roughly whether the system was operating correctly, but it was not good enough to prevent "defective" units from landing by accident.

New test set eliminates the need for two check-out lists, does the job automatically and thoroughly, and reportedly makes it easier for use than to check signals on other ILS systems.

Control Signals—Compared to the 1-1173A test set, which could not be used to check any particular channel, once it transmitted only a random RF signal generated by a buzzer, the new equipment transmits crystal-controlled signals for use of localizer and glide path channels. Further, it is a crash, adapted for operation on 20 channels.

The unit consists essentially of three independent crystal-controlled generators operating on the marker frequency and within the localizer and glide slope bands, a circuit unit which automatically or manually controls the ILS test signals, and a modulator unit which utilizes a 30-cycle vibrator and was initially coupled to the tube oscillator

for stabilizing frequency of the 90 and 150 cps. modulator times generated.

In general, the Model 218A set checks localizer and glide path receivers for correct receiver, course sensitivity, and RF sensitivity. Marker receivers are checked for RF sensitivity and modulation. Controls are provided to make proper calibration adjustments of RF output, percentage of modulation, course receiver sensitivity, and for the 30-cycle modulator used in the modulator unit. Wave interference usually encountered with glide path test stations (150 mc) is avoided by selection from three equipment in accordance with use of a receiver efficiency antenna system.

75 Ft. Away—The output of the G218A is said to be sufficient to couple into ILS and marker receivers located at very points on the runway. Tests on the unit were performed as far as 75 ft from the plane.

For routine tests, one can utilize the automatic feature of the device to check all ILS receivers and associated antenna systems without assistance in less than 3 min. An automatic switch cycles the test parameters for sequence keying of the glide slope localizer and marker receiver, RF signals and modulator receiver. Both a visual and aural check of the receiver in the result can be made during the automatic sequence. A time-interval switch starts the test unit at a preset time. Device can be manually operated to troubleshoot some particular part of the system.

Detailed Check—The author reports that the tester will provide a detailed check of the entire ILS installation. In actual use, it has proved easily transmissible low, check, check, and intermediate level, lower correction, intermediate localizer and glide path antenna, and finally some pointer measurements.

Pan Am has installed its test sets in handsets equipped with batteries, pin-pointing them at remote airports in this country and overseas. Power required to operate the unit is only for the Varcos elements of the device and is said to be 15 x 13 x 9 1/2 in. dimensions, case provided with retractable check, including receiver antenna the complete set weighs 15 lb.

## All-Purpose Hammer

"Bar M" all purpose mechanic's hammer offered by Moulden Pipe Co., 10374 Bern Road, Cleveland 2, Ohio, has been developed and marketed under the name of rubber. Medium sized, Duro rubber head, pressure locked on a deep forged steel base, has reinforced low blow-carbon face, and can do heavy work without jerking or getting out of hand. Head has a steel head of 1/2 inch, deep forged steel.

## Aircraft Cleaners

Line of chemical products intended for use by airlines, "Stratus" cleaners and disinfectants, offered by American Chemicals division of Fine Organics, Inc., 111 E. 79th St., New York, N. Y., are specifically designed for aircraft maintenance purposes.

Initial line consists of 10 products, most bearing root name of Stratus plus active dissolving type for primary purposes. Also, each product has created formulae available while in changed whenever product is chemically altered. Some of the new chemicals are Stratus H, solvent machine cleaner; Stratusite, solvent machine cleaner; Stratusite L, disinfectant; Stratusite C, oil and cold and hot tank corrosion remover; FO-161, Navy grade (AN-C-161) carbon remover; Stratusol, safety solvent; and Stratusol, new type of volatile cleaner.



## Cavity Bearing

Applicable for machine shop equipment in aircraft factories, Miller Old Well Bearing, an engineered, patented metal unit developed by Michigan Precision Products Co., Inc., Northfield, Mich., can be used with rivets, large diameter shafts, pillow blocks and in areas subjected to heat. Also, its maintenance characteristics make it particularly useful in guide pin bearing.

Bearing is said to have better load-carrying qualities coupled with greater strength, permitting it to take heavier loads and positively eliminate fitting under most adverse conditions. Unit has cavity of uniform size in center of bearing well achieved by new method in powder metallurgy.

As oil or grease is impregnated into bearing by static pressure, it fills cavity and pores in sintered metal body, giving greater oil content than is possible in conventional bearings of this type. Reservoir coating behind conventional sintered bearing is discarded, and since oil is sealed in body of unit, there is never any dripping of oil.

Consist of three groups, pocket type bearing has open cavity and is particularly suited for heavy load applications.

Spring type unit has spring steel in cavity to provide cushion action for retaining oil—recommended for use in areas subjected to heat. In this unit bearings a group of small holes replace pocket in well will not be sustained.



## Pressure Pickup

Subminiature, telemetering pressure pickup, with range from 0-400 psi and for use in AN/ART-5 or other FM/FM integrating antenna, is announced by Bendix Aviation Corp., N. Hollywood, Calif.

Unit may be used for any value of full scale range from 5 to 250 psi for measurement of differential pressure. When used chamber is sealed with reference pressure, unit may be calibrated for any value of full scale range from 5 to 400 psi. Natural frequency is 100,000 cps, with square wave response in product on length and diameter of connecting tubing. Weighing 0.12 lb., unit is reported to have negligible self-oscillation error.



## Miniature Terminals

Designed to meet requirements of lightweight, space-saving radio parts and associated electronic equipment, new line of miniature terminal tags is announced by U.S. Engineering Co., 523 Commercial St., Glendale 3, Calif. Units are silver plated and specially treated to prevent corrosion.

## Aids Humidity Tests

For use in research laboratories and production plants, versatile test apparatus, developed by American Instrument Co., Inc., Silver Spring, Md., permits precisely controlled variations of humidity and temperature to be re-

ported graphically, according to predetermined program.

Standard equipment provides three humidity-temperature programs scheduled in order of increasing laboratory tests and manufacturing applying parts to government. Schedules are U. S. Signal Corps Standard Cycle No. SC D (1344-B) (except for subzero phase), U. S. Navy Specification Jcs M 765, Signal Corps Standard Cycle No. SA D (1317-A) (except subzero phase). Equipment for other program schedules is available.

Apparatus consists of test chamber, air-conditioning unit, and special control system. Performance is listed as average maximum rate of rise of dew point temperature between 60 and 160 F—plus 0.45 F/min., without load, average maximum rate of all of dew point temperature between 60 and 160 F—minus 0.75 F/min., without load, average maximum rate of rise and fall of dry-bulb temperature is equal to or greater than that for dew point temperature.



## Aerodynamic Test Aid

To meet need for a low-cost, high performance, air supply unit for aerodynamic research and testing, American Aerodynamic Corp., Miami International Airport, Miami, Fla., offers "ASP" as supply package.

Developed originally for a General Electric Co. project, which takes test air production units, the "ASP" and govern ASP is now available for other private and government research programs.

Equipment has several uses. As compressed pipe, air supply, it can be used in one location testing of intake, jet, and turbojet engines, it provides power for air-driven equipment, such as air craft investigation turbines. ASP can supply enough pressure to drive a free jet to Mach 2.5 for investigation testing of unladen flight conditions or for wind tunnel work with a test section of reasonable size.

ASP consists primarily of a Allison V-1710 series engine and components which are standard aircraft parts. Each ASP is a modular unit and can be used in stages.



DRAIN VALVE



STRAIGHT DRIP VALVE



ANGLE DRAIN VALVE



DOUBLE DRIP VALVE



FUEL DUMP VALVE



FLUID INJECTION NOZZLE



DOUBLE SWING CHECK VALVE

# KOHLER

## Precision Parts

### FOR LATEST JET AIRPLANES

The increasing demand for Kohler Precision Parts by leading manufacturers of the newest jet airplanes and other aircraft is the result of the undeviating high standards of Kohler production. With an organization thoroughly experienced and skilled in precision workmanship, Kohler maintains full facilities in one plant, under unified supervision, for forging, sand-casting, tooling, machining, finishing, assembling, testing and inspecting. This assures efficient service and prompt deliveries, as well as unflinching product reliability.

In current aircraft production, extensive use is being made of Kohler drain valves, single swing check valves, double swing check valves, 1500 PSI and 3000 PSI check valves, dual injection nozzles, dump valves, drip valves, metering valves, and many other parts. In addition, Kohler engineers will gladly assist you in developing valves and fittings for any special requirements you may have.

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# KOHLER OF KOHLER

PLUMBING FITTINGS • PUMPING EQUIPMENT • VALVES • PIPES • AIR-COOLING DEVICES

# PLANE FAX

## Rankin Industries keep planes in top shape

Bob Norrwing, general manager of the 25-year-old air industries founded by famed aviator Jim Rankin, tells how Standard products have helped their pilots enjoy trouble-free flying.

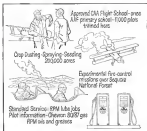
In the last three years, Bob writes, we fleet of Stearman and No. 11 trainers has flown over 3,000 hours on Chevron Aviation Gasoline and RPM Aviation Oil—without a single problem, say as being failures.

Long periods of successful operation between overhauls, cleanliness of engines at shutdown, low wear rate and absence of sludge have convinced us that Chevron Aviation Gasoline and RPM Aviation Oil are the best oils for us.

We also use RPM Aviation Greases in our properties and for all maintenance and find that they have contributed to the excellent performance of our equipment.

Quick picture of

## RANKIN FIELD Tulare, Calif.



### TIP OF THE MONTH "How to avoid an empty tank"



"Don't just check your gas and oil caps, but double-check them and you'll always be safe. If the gas cap is loose and clicks off, there's enough left above the way to replace your tank dry. That's a delicate business, and can mean forced landings."

B. S. NORRWING, General Manager, Rankin Field

### All planes now use Chevron 80/87 instead of 91/88

"We've saved money," Norrwing says, "since we switched to our Chevron 80/87 Aviation Gasoline. It costs less than the old 91/88, but delivers full power in all engines—including the 450 Pratt and Whitney. Private pilots throughout the West now use Chevron 80/87. The fact that pilots take all the time to change from lead and lugs engines running there and closer."



Standard Oil Company of California

A MESSAGE TO AMERICAN INDUSTRY • PART OF A SERIES

1950 . . .

## Our Industrial Machine Is Running Down

In his recent Economic Report to Congress President Truman chalked up a constructive advance in his economic reasoning. He pointed out that if we are going to attain the worthwhile goal of a \$300 billion national income in the next five years, we must equip ourselves with more and better industrial tools. Of all the dynamic forces of expansion in America, he said, one of the most important is business investment.

That is fine. It is basic common sense. We have been saying that for years and we are glad to hear the President say it too.

But having hit this new high in his economic reasoning, the President failed to draw the right conclusion. He made the mistake of accepting the false conclusion that there is no shortage of business funds to pay for more and better industrial tools. "There are immense opportunities for business investment in nearly every segment of the economy," the President said, and further, "there are in general sufficient funds available to businessmen who want to seize these opportunities."

That just is not so—and the lack is not only serious, it may well be fatal.

It is a matter of the most urgent national importance that the President's recognition of the

need of more and better industrial tools should be followed by effective action. That calls for changes in the national policies that are now blocking and, unless changed, will increasingly block business from meeting this need. If business cannot get enough new tools, the result will not be higher, but lower standards of living five years from now.

The President should talk this matter of business investment over with Senator O'Mahoney, the Chairman of the Joint Congressional Committee on the Economic Report. Senator O'Mahoney would take to the discussion knowledge of the investment situation recently acquired through his conduct of a series of Congressional hearings.

If he told the President what he told the press during the course of these hearings, he would say, "The private capitalistic system is being seriously threatened by a lack of venture capital." That is in direct conflict with the President's conclusion that "there are in general sufficient funds available."

This serious shortage of adequate investment in new plant and equipment is brought forth so that all of us can understand it by McGraw-Hill's annual survey of American industry's plans for investment in new plant and equipment in 1950, which has just been completed.

continued on next page

## BUSINESS' PLANS FOR 1950

These are the major findings of the McGraw-Hill survey of "Business' Plans for New Plants and Equipment in 1950. Made by the McGraw-Hill Department of Economics, the survey shows:

1. Industry—represented by manufacturing, mining, transportation, and utilities—now plan to spend \$6.3 billion in 1950 for new plants and equipment, this year. This is 15% less than was actually spent last year.
2. Manufacturers indicate alone plan to spend \$6.3 billion in 1950 for new facilities. This is also 15% less than they spent last year.
3. Manufacturers on a whole expect 1950 sales volume to about equal 1949's.
4. Manufacturers will expand their capacity about 1% in 1950, under present

plans. The largest part of their funds, \$2.6, will go to replace and modernize existing facilities.

1. Profits and reserves are expected to reach 32% of the 1950 estimated funds of manufacturing companies. This compares with an average of 28% for new companies and 30% for old companies.

2. Two out of three manufacturing

A copy of a complete report on "Business' Plans for New Plants and Equipment in 1950" may be obtained by writing to McGraw-Hill Publishing Company, Inc., 120 West 42nd Street, New York 36, N. Y.

companies review their investment plans annually. About 40% of companies say they will expand capacity in 1950.

1. Other industries also are reducing their investment plans in 1950 by 15%. The construction industry, which has the largest capacity, is expected to spend only \$1.5 billion in 1950, or 15% less than last year.

2. The construction industry

The results of the survey, which are summarized above, show that American industry—as represented by manufacturing, mining, transportation and utilities—is planning to spend 13 per cent less for new plant and equipment in 1950 than it did in 1949.

Since the rate of investment in new plant and equipment right now is apparently about 15 per cent below the rate for 1949, the present level of business investment may be relatively steady in 1950. That would reduce the fear, expressed by President Truman in his Economic Report, that "if the downward trend in business investment were to continue, our prospects for full recovery and continued expansion would be seriously endangered."

BUT, at the rate of investment planned by American manufacturing industry for 1950, it would take 40 years to modernize thoroughly our present industrial plant and equipment. That would only have undone the job of increasing it to meet the needs of an expanding economy of the kind sketched by President Truman in his message.

In stating even this rate of investment, the McGraw-Hill survey shows American business must rely overwhelmingly on its own profits, which have declined as the country has left the postwar boom behind it. Most American companies cannot sell new common stock except at relatively low prices. Here is one case where gov-

ernment action is really needed to help business and help to keep a rising American standard of living.

In order to get enough business investment to assure the "full recovery and continued expansion" sought by the President, our country needs:

1. Lower taxes on business income so as to release more money for new plant and equipment.
2. Liberalized depreciation allowances on old plant and tools so that business can buy new equipment faster.
3. Repeal of the present double taxation of dividends which now are taxed once as corporate income and again as personal income.

It is encouraging to have the President explicitly recognize the key importance of adequate business investment in providing steadily expanding prosperity. The next and most important thing to do is to make this recognition effective by discharging national policies which are blighting an adequate volume of business investment.

*James H. McGraw, Jr.*

President, McGraw-Hill Publishing Company, Inc.

## AIR TRANSPORT

### Further Lightplane Use in Doubt

CAB is beshorn on any more authorization for scheduled short-haul carrier operations, pending more data.

The Civil Aeronautics Board has imposed rigid limits on its operations with the use of single-engine and small two-engine planes in scheduled short-haul airline operations.

Proctor now using light aircraft for scheduled operations are: Coastal Airlines, Fort Worth, Tex., which operates single-engine Beech Bonanzas; Mid West Airlines, Des Moines, which operates single-engine Cessna 150s; and Wiggins Airways, New York, N. Y., which has four passenger two-engine Cessna T-38s.

A fourth certified carrier, Indianapolis-based 101st Aviation, has been given permission to use light aircraft on some of its feeder routes. The aerial feeder needs of the experiment are being weighed, as more carriers should make plans for incorporation of lightplane service without compensation with Board officials, CAB said.

Toronto has been operating its Indianapolis Grand Rapids, Mich., route with DC-3s since Nov. 12. But it will use Beech Bonanzas on its Indianapolis Chicago, Indianapolis Grand Rapids, and Indianapolis Louisville segments until airport conditions on these lines require service exclusively to permit use of transport type equipment.

Defa Source-Little said a pilot available on the lightplane feeder operations. Wiggins and Coastal did not start service until the middle of September, while Mid-West began scheduled flights Oct. 21. During the first months of operations, service was provided over only part of each carrier's route.

Coastal started 315 revenue passengers with a 15 percent load factor in October and 346 passengers with an 18% percent load factor in November. Opening of additional service in Oklahoma, Texas and Kansas continued through the end of the year.

Wiggins flew 123 passengers and had a 21 percent load factor on its Boston-Albany routes in October, flew 139 passengers for a 15.6 percent load factor in November and 135 passengers for a 10.7 percent load factor in December. Mid-West flew 120 passengers and 38,523 lb. of mail over its Iowa-Norfolk-South Dakota-Minnesota route between Oct. 21, when it started

service, and Jan. 1. Passengers load factor in November was 16.9 percent.

Definite Mail Pay Needed—With all of the lightplane lines starting service during the fall traffic downswing, several financial figures show a marked dependence on mail pay.

During November, Mid West reported \$1205 passenger revenue and \$20,020 mail revenue but suffered a \$944 net operating loss. Wiggins in the same month had \$700 in passenger revenue and \$8299 in mail revenue but showed a net operating loss of \$2164.

Central was in the black for November, reporting \$2581 passenger revenue, \$37,133 mail revenue and a \$10,186 operating profit.

Mail pay for the lightplane lines is running considerably higher than the 10-18 cents a plane-mile local-carrier figure envisioned when CAB launched its experiment last June. On lines where more than one roundtrip daily is flown, Wiggins, Mid West and Central are receiving temporary mail pay of 40 cents a plane-mile for the first six

months of service. The temporary rate will be cut to 35 cents a plane-mile for the sixth to ninth months, 30 cents for the tenth to twelfth months, and 25 cents after the first year.

May Need More-By comparison, local mail transport-type equipment such as DC-3s received 60 cents a plane-mile temporary mail pay when they started service. When local mail rates were set for the transport-type lines, the average rate for the first year of service was up to between 70 and 80 cents a plane-mile. However, temporary mail pay for the lightplane lines also may have to be boosted when local rates are cut.

Central's south transport-type line, based at Portland, Ore. and Southport, Ariz., are able to operate profitably at a rate of around 45 cents a plane-mile. It is believed unlikely that CAB will extend the certificate of lightplane feeder which can keep their local mail pay needs below 30 cents a plane-mile following the first year of such service.

Pay Cut Eyed—In an effort to stimulate traffic and reduce its subsidy requirements, Central Airlines plans to cut fares 15 percent—from about 6 cents to 5.2 cents a mile. It has filed suit to force CAB to prevent the reduction effective Feb. 12.

The carrier said the lower level would not create an undue competitive situation since its routes parallel other lines on only two segments. Even on these links, Central contended, the lower rates could create little traffic



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## Subversive Employees and the Bell Decision

The phase of the Bell Aircraft Corp. strike settlement concerning subversive employees deserves wide publicity. Its importance extends beyond the aircraft industry. It clearly affects every company working on classified governmental projects.

The final decision was issued by a Board of Inquiry appointed by the Industrial Commissioner of New York State after all other forms of mediation and conciliation had failed in the strike called by a UAW-CIO union against Bell. Board members are distinguished citizens, fully informed and cognizant of labor management, national defense and security problems.

Dr. Edmund Sam Day, Chancellor of Cornell University, was chairman. Members were Dr. Samuel C. Copen, chairman of the Syracuse University Law School, Col. Charles Condit, prominent New York City attorney, and Mrs. Eleanor G. Hirsch, personal director of the New York Herald Tribune, a former director of the National Labor Relations Board and an acknowledged labor relations authority.

The Board faced the problem of subversive workers squarely, in both its interim and final decisions. The Board ruled that in view of the classified nature of the work Bell is performing for the federal government, the company should not be required to continue as its work force persons who had been designated as security risks by the Air Force or other government agencies.

This part of the decision is without precedent in American industry, as far as can be determined by aircraft labor specialists. It certainly can be used as a guide in any future applications of the security requirements in industry contracts with government.

After days of careful study and consideration of the case involving the ten Bell employees, the Board said in its final award:

"The company is responsible to the United States Armed Services for the security within the plant of classified materials and operations. The Board carefully considered all the evidence bearing on this issue and made a line of inspection through the plant, as far as permitted to do so by the U. S. Air Force security officers, studying and observing the layout as it affected security and the possibility of spying, was regarded as had security risks."

"The Board decided that the company should not be required to reemploy the six men thus 'tagged'."

In its interim decision the Board had ordered the close to be added to the labor agreement.

"The Union recognizes that the company has certain obligations in its contracts with the government pertaining to security, and agrees that nothing contained in this contract is intended to place the company in violation of its security agreements with the government. Therefore, in the event that the United States Air Force, or any other government agency concerned with Bell Aircraft Corp., security regulations, advises the company that any member of Local 504 is restricted from

work on or access to classified information or material, the Union will not contest any action the company may reasonably take to comply with its security obligations to the government."

The question of employment of members of organizations labeled "subversive" by the U. S. Attorney General or those deemed poor security risks by other government agencies for other reasons, is one which has plagued the aircraft and other industries for years.

Those conducting our whole atomic research and development program as well as the important work carried on by major electric companies, have grappled with the same question without arriving at satisfactory answers.

Industry observers point out that the mere transfer of a "poor security risk" employee from one job to another or from one part of the plant to a remote section of the plant does not diminish the risk. It is almost impossible to protect 100 percent the classified work as a plant of any size. It would require constant guarding of one individual or perhaps a handful, depending upon the circumstances. A plant with any number of "poor risk" would be forced to devote most of its time to watching these employees, at considerable expense and loss of production.

While it is accepted that government agencies are doing much to ferret out and provide protection against subversive persons, there are inconsistencies in the government approach to the problem. For one thing, when a person is designated as a "poor security risk" for a plant which is engaged in top secret projects, the plant is not ordered or directed to discharge the employee. Rather, it is charged with the full responsibility of keeping that employee from having access to government work.

There is a big order, in many cases, particularly in those plants which are not set up, either for physical or environmental reasons, to keep everything classified under lock and key, and a constant guard. Production demands and security instructions are forever coming across, and plant managers and security officers are constantly making their brains to reach reasonable solutions on both subjects.

There is no question but that this high-caliber board acts a pattern for its making on subversion. Its ruling will exert an important influence on labor-management or boards of arbitration wrestling with labor-management disputes on the same issue. What is more, it recognizes that labor must in some of our most important plants is due to the agitation fomented by the same persons who already have been officially designated as "poor security risks."

Once an employee of a company engaged in highly classified work is designated as an undesirable employee because of security hazards, that person's employment should be terminated. So says the Board, with no strings attached.

Subversives have no place in our defense plants.  
Robert H. Wood

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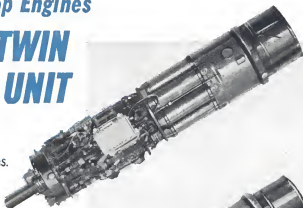
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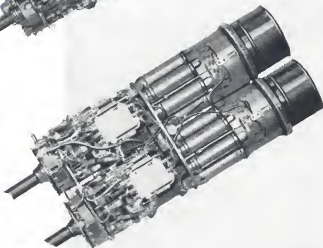
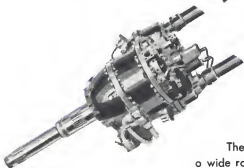
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